Prof. Kumud Shankar Das Memorial Lecture 2023

Book of Abstracts

ONE DAY NATIONAL SEMINAR on

'Recent Advances in Biological Sciences'

4th MAY, 2023

Organized by

Department of Botany

Surendranath College, Kolkata

Under DBT Star College Strengthening Scheme, GOI

In Collaboration with

Prof. Kumud Shankar Das Memorial Foundation

SURENDRANATH COLLEGE

सत्यमेव जयते
DEPARTMENT OF BIOTECHNOLOGY
GOVERNMENT OF INDIA

DEPARTMENT OF BOTANY
SURENDRANATH COLLEGE

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K.S. Das Memorial Foundation

DEPARTMENT OF BOTANY
SURENDRANATH COLLEGE
24/2, M.G. ROAD, KOL-9

Prof. Kumud Shankar Das Memorial Lecture 2023

ONE DAY NATIONAL SEMINAR

ON

Recent Advances in Biological Sciences

4th MAY, 2023

ABSTRACT

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Surendranath College, Kolkata
Under
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Order of Content

Serial No.	Description	Page No.
1	Message from Patrons and Guests	-
2	Surendranath College and Botany Department	3
3	Our Founder and First Head of The Department	4-5
4	Organizing Committee	6-7
5	Programme Schedule	8
6	Lecture 1	9-10
7	Lecture 2	11
8	Lecture 3	12-13
9	Abstract of School Students	14-16
10	Abstract of Under Graduate and Post Graduate Students	17-33
11	Abstract of Faculty and Research Scholars	34-41

উজ্জল বিশ্বাস
(ভারপ্রাপ্ত মন্ত্রী)
বিজ্ঞান ও প্রযুক্তি এবং জৈবপ্রযুক্তি দপ্তর
পশ্চিমবঙ্গ সরকার
বিজ্ঞান চেতনা ভবন
২৬/বি, ডিডি ব্লক, সেক্টর - ১, সল্টলেক
কোলকাতা - ৭০০ ০৬৪
দূরভাষ ঃ (০৩৩) ২৩৩৪-৮০৭৪, ২৩৩৪-১৪৩৩
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No.68–MIC/STBT

Date: 02.05.2023

MESSAGE

It gives me immense pleasure to learn that The Surendranath College, Department of Botany is organizing a 'National Level Seminar' on the 4th May 2023.

I am also happy to learn that **Abstract Book** will be published to commemorate the occasions.

I convey my best wishes to the organizers.

Ujjal Biswas 2.5.23
(Ujjal Biswas)
UJJAL BISWAS
Minister-in-Charge
Department of Science & Technology
and Biotechnology
Government of West Bengal

To
Kousik Ghosh
Sonali Ray
Joint Convenor
Organizing Committee
Department of Botany
Surendranath College,
Kol-09

Mr. Dipanshu Gangopadhyay,
President, Governing Body,
Surendranath College

Message

I am very much delighted and feel proud to learn that the Department of Botany, Surendranath College is going to organise a "National Level Seminar" on the occasion of Prof. Kumud Sankar Das Memorial Lecture", 2023. In my humble view, the theme of the Seminar is very much fruitful and time-oriented. The speeches to be delivered by the distinguished speakers on the occasion will help the students of higher classes and Research Scholars a lot.
Such a Seminar will also add a feather to the glory and reputation of Faculty of the Department to organise such a dimensional National Level Seminar is praise-worthy.

I hope and pray that the Seminar will be highly successful.

D. Gangopadhyay

Dr. Indranil Kar, Principal, Surendranath College

Chairperson, Organising Committee,

Message

I from seminar chair invite you all to be a part of Kumud Shankar Das Memorial Lecture, 2023 (One Day National Seminar). The seminar aims to bring together teachers, researchers, scientists, and students from all over the country to share concerns related to advances and challenges in Biological Sciences. I on behalf of entire organising committee, welcome all delegates of the seminar. I appreciate the efforts taken by all authors, sponsors and keynote speakers for their support and co-operation. The seminar theme is Recent Advances in Biological Sciences. We are fortunate to have expert speakers to share their experience. I hope the multidisciplinary approach of this seminar will help everyone to learn from different disciplines. I would like to express my gratitude towards the organizing committee for their dedicated efforts to materialize the seminar under the DBT Star College Strengthening Scheme. I hope all the participants will have a fruitful and beneficial experience. Finally, I congratulate college faculty, staff and student representatives and participants for their efforts in organizing and participating in this seminar and wish the seminar all the success.

Dr. Indranil Kar

Principal, Surendranath College

Message

Professor Rita Kundu
Professor and Head of the Department,
Department of Botany,
University of Calcutta

I would like to thank you for your letter. This is one of the oldest colleges with a Botany Department, so I am really happy to know that you have arranged such a National Seminar on the occasion of "Kumud Shankar Das Memorial Lecture' on 4th of May, 2023. It is a nice way of paying tribute to our revered teacher.

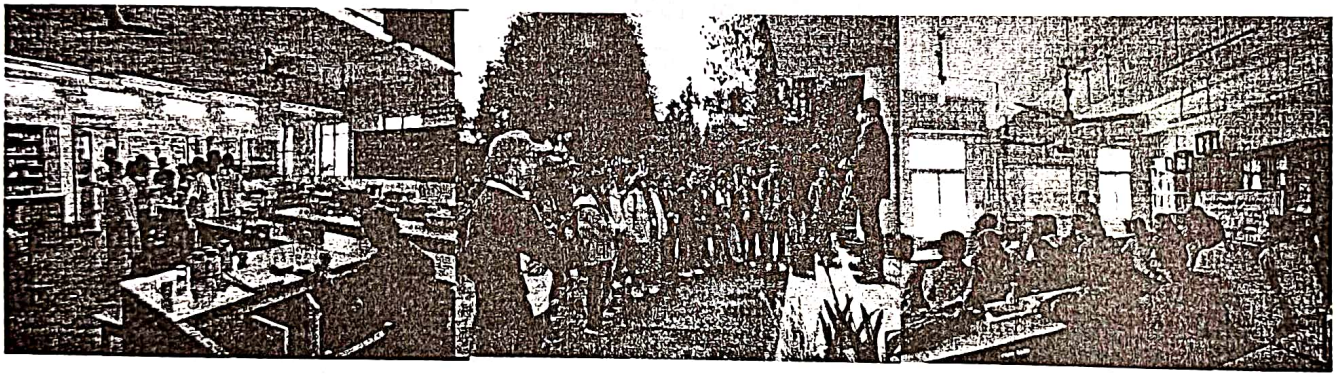
It is my pleasure to know that SurendraNath College has organized a National Level Seminar, with a theme, 'Recent Advances in Biological Sciences'. The theme is very much appropriate and very important and relevant. I hope that the Seminar will be helpful to our students, scholars and faculties, opening up new vistas to look into and encouraging them in unraveling the subject hitherto unknown.

I extend my greetings and best wishes to all the organizing members and participants and wish this Seminar a grand success.

Rita Kundu,
Head of the Department,
Department of Botany,
University of Calcutta

SURENDRANATH COLLEGE & DEPARTMENT of BOTANY

In 1882 Surendranath Banerjea, an eminent scholar, orator, and statesman and one of the pioneers of India's struggle for self-government and freedom, took over the charge of Presidency School. In January 1884, it was renamed Presidency Institution and became affiliated to the Intermediate Standard of the University of Calcutta. Later in the same year, with permission from Lord Ripon, it was renamed as Ripon College and became a full-fledged degree College under the University of Calcutta. Surendranath Banerjea himself taught in the College for many years with rare distinction. Under his inspiring guidance a generation of students grew up with sacrifice and idealism as their guiding principles. Around him gathered some of the most distinguished scholars and intellectuals of the time and Ripon College soon came to be counted among the reputed seats of learning in the country. In 1885, the Department of Law was started. It was converted into a separate College in 1911 and it was named Ripon Law College. The Department of Commerce was established in 1940. A branch of this College was opened in Dinajpur (now a separate College in Bangladesh) in 1942. The trustees, to keep pace with the changing needs of the time, opened an evening Science section in 1947 and a women's section in 1948 as well. The former is now a part of Surendranath Evening College, and the latter became an independent Degree College in 1960. In 1948-49, the Trustees renamed the College as Surendranath College as a mark of respect to the founder of the institution and author of A *Nation in Making*.



The Department of Biological Sciences was established in the year 1936 and Prof. Kumud Shankar Das took the charge of that Department after seven months service in Bethune College. Botany is the oldest, post-Independence, department among Biological Sciences of the College. The department started its journey in 1947 with the General course in Undergraduate. The Botany Honours Course was introduced in 1957 under the able leadership of Prof. Kumud Shankar Das.

OUR FOUNDER AND FIRST HEAD OF THE DEPARTMENT
PROF. KUMUD SANKAR DAS

Prof. Kumud Sankar Das was born in the 5th day of May 1913 (21st day of Baisakh) at Rangoon in Mayanamar erstwhile Burma to Late Sri Nagendra Kumar Dasgupta.

He completed his education upto Matriculation at Rangoon and thereafter he came to Calcutta. He did his graduation from Presidency College, Calcutta and did his post-graduation from University College of Science, Calcutta in the year 1935. During his student life at Rangoon, he became actively involved in freedom movement and came in close association with 'Masterda', the great martyr of "Chattagram Asthagar Loonthan". Possibly during or after his involvement in freedom movement he used the surname Das instead of Dasgupta. He also decided not to join any Government organisation as his name was enlisted in the British police.

After completion of post-graduation, he joined Bethune College, Calcutta as a lecturer for a short period of time under the Principalship of Prof. Tatini Sarkar. Then he joined Surendranath College, the then Ripon College in the year 1936 as a lecturer in Biological Sciences. He was the founder of the Department of Botany in Surendranath College in the year 1947with General degree course and introduced Honours in the year 1957 and served as Head of the Department; the post he held till his retirement on 31st May 1978. He served this College for about 43 years. In the early 1960's inception of Human Physiology Department in this College took place by his initiative.

Prof. Kumud Sankar Das was an eminent Botanist. Main subject of his interest was Plant Anatomy and was very much influenced by the philosophy of Haberlandt. Feeling the scarcity of standard textbook in Biology in India and Pakistan during that time, he jointly with Prof. J. B. Mukherjee published 'Outlines of Biology' for Intermediate and Medical students in July 1950. Possibly this was the only published book in Biology at that time written by Indian authors. He has a number of publications and books to his credit. Among them 'College Botany' for honours students is the major contribution of Prof. Das.

He served the Department of Botany, Calcutta University for a long time as honorary visiting lecturer in the late 1950's. Mainly he taught Plant Anatomy in post-graduate classes. He also worked as honorary part-time lecturer in Serampore College and founded the Department of Biology there. He always encouraged budding scientists in their research works.

As a teacher, Prof. K. S Das was a most successful one. His class lectures were with full of scholastic English with authentic information. His mode of expression in the classroom attracted students, even from other colleges of Calcutta. He loved gossiping with peoples of all categories and always maintained cleanliness in every respect of life, even in his personal dress. He was a great lover of nature and in particular, he was a lover of Himalayas. His most favorable hill station was Ranikhet, situated at Kumaon range. He was associated with several Mountaineering

Clubs. He was an active member of Ramakrishna Mission and was associated with Botanical Society of India, Viswa-Bharati University and different social organisations of Serampore belt. One of his personal hobbies was gardening. He maintained a well-managed roof garden in his house. Another personal hobby includes collection of elegant fountain pens of different makes.

He lived his wife to its fullest, overcome evils and temptations, fought wrongs and helped others to do the same. He believed very much in self-confidence. He was a philanthropist, a man of personality and a man of letters. He breathed his last on September 3rd, 1983 at the age of 70 years and was survived by his wife, daughter and son.

Prof. Prabir Kumar Ganguly
An Alumni, Former Faculty and Head of the Department
(A Direct Student of Prof. K.S. Das)

Prof. Kumud Shankar Das Memorial Lecture, 2023

ONE DAY NATIONAL SEMINAR

on

'Recent Advances in Biological Sciences'

4th MAY, 2023

Patrons

1. Shri Sudip Bandyopadhyay, Member of Parliament (Lok Sabha), Kolkata Uttar Constituency of West Bengal, India
2. Smt. Nayna Bandyopadhyay, Member of West Bengal Legislative Assembly, Chowrangee Assembly Constituency
3. Sri DipanshuGangopadhyay, President Governing body, Surendranath College
4. Sri Debasish Banerjee, Government Nominee, Governing body, Surendranath College; Advocate Calcutta High Court
5. Sri Pinaki Chandra Matilal, Government Nominee, Governing Body, Surendranath College; Advocate Calcutta High Court
6. Sri Gobindalal Mondal, Calcutta University Nominee, Governing body, Surendranath College; Associate Professor Mathematics, New Alipore College
7. Ms. Swapna Banerjee, Calcutta University Nominee, Governing body, Surendranath College; Dean (Acting), Faculty Council for Post-Graduate Studies in Education, Journalism and Library & Information Science (Acting) &Professor., Dept. of Library and Information Science, University of Calcutta.
8. Dr. Kali Pada Sarkar, Ex Faculty, Department of Botany, Surendranath College
9. Prof. Sudhir Kumar Bhattacharya, Alumni; Ex Faculty and HOD, Department of Botany, Surendranath College
10. Dr. Ashok Bag, Alumni, Ex Faculty, Presidency College
11. Prof. Barid Baran Mukherjee, Alumni, Department of Botany, Surendranath College
12. Prof. Sambhu Ghosh, Alumni, Department of Botany, Surendranath College
13. Prof. Prabir Kumar Ganguly, Alumni; Ex Faculty and HOD, Department of Botany, Surendranath College
14. Prof. Santinath Sarkar, Alumni, Ex Faculty and HOD; Department of Botany, Surendranath College
15. Dr. Archana Banerjee, Ex Faculty and HOD, Department of Botany, Surendranath College
16. Dr. Biswanath Bhowmick, Ex Faculty and HOD, Department of Botany, Surendranath College
17. Prof. Sandip Mukhopadhyay, Alumni; Ex Professor & HOD, Department of Botany, University of Calcutta.
18. Dr. Sujit Kumar Das Das, Alumni, Department of Botany, Surendranath College;
19. Sri Santipada Das, Alumni, Department of Botany, Surendranath College
20. Dr. Subhajit Bandyopadhay, Alumni; Associate Professor, Botany, Narasinha Dutt College
21. Dr. Suchandra Chatterjee, Associate Professor, Chemistry; Director, IQAC; Coordinator DBT Star College Straitening Scheme, Surendranath College

Organizing Committee

President: Dr. Indranil Kar, Principal, Surendranath College

Conveners: Dr. Sonali Ray & Sri Kousik Ghosh

Jt. Conveners: Dr. Dipasree Roychowdhury & Dr. Suranjana Sarkar

Treasurer: Dr. Jayanta Sikdar

Reception & Refreshment Convener: Dr. Nilofer Khatoon

Abstract and Publication Convener: Dr. Amit Saha

Members: Ms. Baishali Pandit (Faculty), Antara Nath, Riya Karmakar, Bratati Sarkar, Arpita Gupta, Akanksha Pal, Injla Anikah Ali, Anamika Sarkar, Priyanshu Char, Souvik Panja, Bidisha Mistry, Priya Banik, Manorama Kumari, Amit Mistri, Partha Protim Naskar, Rasel Parvez, Asif Anwar Khan (Students)

Volunteers: Anuska Nath, Shatabdee Sarkar, Richi Kisku, Sonia Sarkar, Ritupa Majumder, Sk Abdul Momin, Anisur Rahaman, Rhishik Saha, Bikram Mahanta, Deep Dutta, Suparna Ojha, Tanupriya Das, Rinki Chowdhury, Shreya Das, Kasturi Mahato, Ankita Karmakar, Leona Bagchi, Banhisikha Poddar, Md Akib Ansari, Navonil Sadhu, Badhan Bala, Srijan Samanta, Arijit Karmakar

Programme Schedule

Registration:		10.00 am to 10.30 am
Inauguration:	By Watering of Plant	10.30 am to 11.15 am
Felicitation:	Distinguished Guest and Speakers	
Welcome Address:	Dr. Indranil Kar, Principal, Surendranath College, Kolkata	
Presidential Address:	Mr. Dipanshu Gangopadhyay, President, GB, Surendranath College, Kolkata	
Address by President KSDF:	Prof. Prabir Kumar Ganguly, Alumni & Ex HOD, Department of Botany Surendranath College, Kolkata	
Address by Vice President KSDF:	Prof. Sandip Mukhopadhyay, Alumni & Ex HOD, Department of Botany, University of Calcutta	

TEA BREAK-11.15 am

Lecture-1:	Prof. M. Sabu, CSIR-Emeritus Scientist, Malabar Botanical Garden and Institute for Plant Sciences, Calicut	11.30 am
Lecture-2:	Dr. Nilansu Das, Associate Professor & HOD Molecular Biology, Surendranath College, Kolkata	12.45 pm

LUNCH BREAK-1.30 pm

Poster / Model Session	--	2.30 pm
Lecture-3:	Dr. Kanad Das, Scientist- E, Botanical Survey of India, Howrah	3.30 pm
Prize Distribution		4.45 pm
Vote of Thanks	Dr. Sonali Ray and Shri Kousik Ghosh, Conveners, Organizing Committee, Department of Botany	5.15 pm
Closing by National Anthem	-	-

LECTURE 1

Prof. M. SABU, Ph.D., FNA,FASc.; Formerly Professor and Head,Department of Botany, University of Calicut, &CSIR- Emeritus Scientist, Malabar Botanical Garden & IPS, Calicut

- Teaching & Research Experience: 36 years
- Specialization: Taxonomy of Angiosperms, Pollination biology, Floristics, Zingiberales
- Number of Books published: 13
- Number of International Publications: 176
- Academic activities: Chairman/Member of Board of studies, Faculty, Academic Council of University of Calicut, Kannur University, Cochin University of Science and Technology.
- PAC member of DST-SERB, MoEF, KSCSTE, DBT, National Geographic Society, Washington DC.
- Number of new species described: 76
- New Generic records for India: five
- New records for India/Southern India: 24
- Rediscovery of species (57- 155 years): 11

Medals received:

- E. K. Janaki Ammal award in Taxonomy instituted by MoEf& CC (a memento, citation and Rs. 5 lakh cash)
- Prof. Panchanan Maheswari Gold Medal
- Prof. V.V. Sivarajan Gold Medal 2014

Awards Received:

- Fellow, National Academy of Sciences, New Delhi (FNA) 2019
- Fellow Indian Academy of Sciences, Bengaluru (FASc.) 2020
- Best Researcher Award of Calicut University 2012.
- Fellow, Indian Association for Angiosperm Taxonomy (FIAT).
- Elected Fellow of the Linnean Society, 2012. London (FLS).
- Elected as the Secretary of the Indian Association for Angiosperm Taxonomy. 2009 – 2019 and Treasurer IAAT 2003-2008.
- Executive Editor, Rheedea, 2012-2018.
- Nominated as IUCN Species Survival Commission Indian Subcontinent Plant Specialist Group member
- Fellow of the Indian Botanical Society (FBS).

Plants named after Sabu:5

Musa sabuana, Zingiber sabuanum*and *Amomum sabuanum, Curculigosabuii, Lepidagathissabuii

Plants are one of Earth's greatest resources. They are sources of food, medicines, and materials with vast economic and cultural importance. They stabilize ecosystems and form the habitats that sustain the planet's animal and microbial life. They are also threatened by climate change, the environmental factors and human interaction. There are an estimated 400,000 species of vascular plants on Earth, with some 10percent more yet to be discovered. These plants, both known and unknown may hold answers to some of the world's health, social and economic problems. A full inventory of plant life is vital if their full potential is to be realized before many of these species, and the possibilities they offer, become extinct.

The Zingiberaceae and Musaceae form an important group with considerable economic potential such as *Alpinia*, *Amomum*, *Curcuma*, *Elattaria, Hedychium, Kaempferia, Zingiber*, *Musa, Ensete* etc. In India, many species of this group have been used in Ayurvedic and other native systems of medicine and as spices and condiments since time immemorial. However, the ornamental value of Indian gingers has not been utilized fully so far. These families are well represented in India with 26 genera and about 240 species.

The gingers and bananas are having beautiful, sweet, scented flowers and are of great commercial values. They are wonderful group of plants related to edible gingers and bananas. These families include several ornamental plants and have rapidly increased popularity in the past few years. The plants are distributed mainly in North-East India, peninsular India, South India and Andaman and Nicobar Islands.

There are mainly two types of gingers based on their growth habit. They are the evergreen and non-evergreen groups. The former can be grown outdoors in summer and as houseplants in winter and the later varieties need a winter dormancy period when they are stored cool (but not cold) and dry to wait for the next growing season. There are varieties for sun, shade and in-between. Some varieties of ginger have fragrant flowers and others have spicy foliage. The *Hedychiums* (butterfly gingers) and some species of *Costus* are the most fragrant types of gingers. It is estimated that about 59 species of wild Indian gingers and bananas apart from commonly cultivated species, can be domesticated for ornamental purpose.

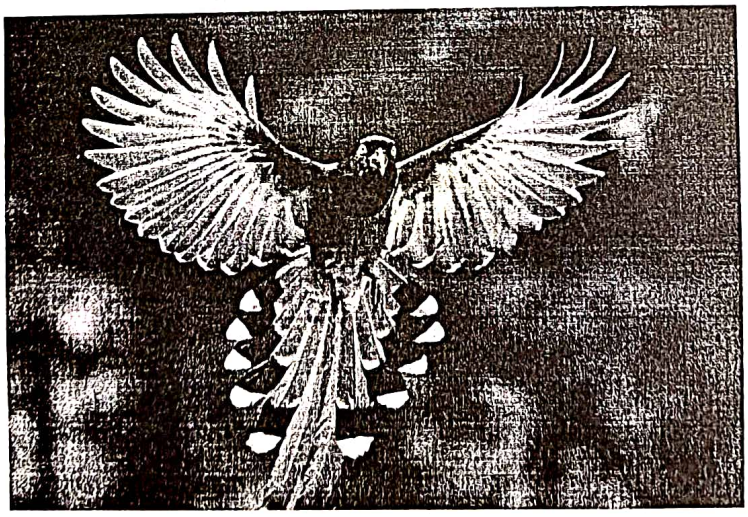
Musaceae are commonly known as 'banana family,' with a lot of wild seeded species to seedless cultivars. It is considered as taxonomically difficult group as it consists of large fleshy parts and difficult to work with the herbarium. The family is characterized by the presence of tall pseudostem, long inflorescence, five fertile stamens and a sixth much reduced staminode in male flowers and the occurrence of large fruits which are edible or not are the unique feature which distinguish it from other families of Zingiberales. In India, Musaceae are mainly distributed in northeastern States, Western Ghats, Eastern Ghats and Andaman and Nicobar Islands.34 wild taxa of Musaceae under two genera of which two species of *Ensete*and32 taxa of *Musa*have been identified from India. Twenty-five species of *Musa*, one variety of *M.acuminata*, four varieties of *M. balbisiana*, one variety of *M. sikkimensis* and one variety of*M. velutina*. Original bananas were seeded and non-edible forms growing in damp and humidforests.

Nearly 25% of the total taxa in India are under severe threat. Both *exsitu* and *insitu* conservation of all taxa were carried out in the Calicut University Botanical Garden and Malabar Botanical Garden. A live germplasm of about 300 taxa and over 2000 accessions were conserved in five green houses and about three acres of land in these gardens.

LECTURE 2

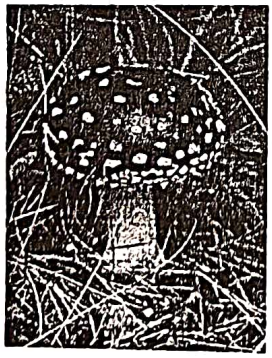
Dr. Nilansu Das, Associate Professor and Head, Department of Molecular Biology, Surendranath College, Kolkata and a Professional Bird Watcher & Photographer

Bird watching is the buzz of the day. People of all age, cast, sector are getting interest in bird watching. Bird photography has achieved an astonising level. Like other walks of life, Bird watching has also evolved over the period of time. The presentation will follow on different aspects of Bird behaviors and bird watching also the benfits of the hobby.



Dr. Kanad Das
Scientist 'E'
Central National Herbarium
BOTANICAL SURVEY OF INDIA

Dr. Kanad Das is presently working as Scientist 'E', Botanical Survey of India, Central National Herbarium, Howrah. He has been working on diversity and taxonomy of wild mushrooms since last 24 years. After undertaking research on the Taxonomic Studies on Wild Mushrooms of Kumaon Himalaya, he was awarded with Doctor of Philosophy by H.N.B. Garhwal University, Uttarakhand, India in 2005. He was also the regional Head of Botanical Survey of India, SHRC, Gangtok during 2009 to 2013. He has surveyed vast regions of Indian Himalaya from West to East and some parts of Western Ghats in India. Till date he has discovered/established 2 novel genera, 140 new species (new to science) of wild mushrooms from this country. He (himself/jointly with his co-workers) has published 4 books, 142 research papers and 6 edited book chapters. Many invited talks are delivered by him in India and abroad. Being invited by the Government of Andalusia, in 2007, he delivered his presentation in the opening session of the First World Conference on the Conservation and Sustainable use of Wild Fungi in Cordoba, Spain in 2007. He also represented the country in the International Russulales Workshop in Slovakia in 2014. Five students carried out research for their Ph.D. under his supervision. He is the member of some learned societies. He is the recipient of Bharat Jyoti (2015) and Prof. K.S. Thind Medal (2020) for his outstanding contribution to mushroom taxonomy.



TOPIC

UNCOVERING WILD MUSHROOMS OF INDIA: MORPHO-TAXONOMY TO MOLECULAR PHYLOGENY

The Kingdom Fungi represents a monophyletic clade and is the kith and kin to the Animal Kingdom. They are estimated 2.2 to 3.8 million species on this planet and are enormously diverse and responsible for key functioning in every terrestrial ecosystem. Among fungi, wild mushrooms are representatives of two highest phyla namely, Ascomycota and Basidiomycota. Some of them are edible, some are not worth-taking and few are poisonous. They are immensely diversified in macro- and micromorphology. Morphologically, they can be grouped into several artificial assemblages such as, Agarics (gilled fungi), Boletes (fleshy poroid fungi), Bracket fungi (woody poroid fungi), Pseudo-gilled fungi, Teeth fungi, Jelly fungi, Club fungi, Cup fungi, Stomach fungi, Stinkhorns, Saddles, Bird's nest fungi, Coral fungi, Earth tongues, Morels, Shaving brush fungi, Cauliflower fungi, Crust fungi, etc.

In spite of their manifold importance to ecosystem and mankind, they remain either unexplored or seriously underexplored in this country. Moreover, names of European and American species were often misapplied on most of our Indian species. Therefore, even though some documentations were made by our taxonomists on Indian mycobiota, they are eventually found to be incorrect in many cases. Like plants and animals, extensive as well as intensive surveys of wild mushrooms are the first important requirements that should be fulfilled methodically and systematically on priority basis. Critical observation followed by thorough macro- and micromorphological characterization are the need of the hour in order to identify them (wild mushrooms) correctly. The mushroom taxonomist wholeheartedly desires that there should not be a single collection left unidentified in the field itself, however it is found that only a few taxa can be identified correctly based on the field (macromorphological) characters. Moreover, now it is evident that combination of macro- and micromorphological features are also insufficient to identify most of the Indian species correctly as there are several cryptic species (species complex) or intercontinental lookalikes in almost all the genera. Presently, it is understood that proper identification along with the taxonomic placement of a species is only possible if the combined study of morphology and molecular phylogeny can be undertaken for every species. Let us join hands and unveil the wild mushroom wealth of India.

ABSTRACT of
SCHOOL STUDENTS

S-P/M-1

Automated Greenhouse System

Ipshito K. Ghosh
Class 10, St. Joseph's College,
69 & 70, B.B. Ganguly Street, Bowbazar, Kolkata-700 012
Email: ipshito.k@gmail.com

The given project, an Automated Greenhouse System, is a cutting-edge technological solution that offers a vast array of functionalities. By utilizing microcontrollers, sensors, and actuators, the greenhouse can be controlled remotely. The system's operation is based on threshold values, which, when exceeded, trigger various visually striking instruments via the circuit. The system can monitor several parameters, including temperature, humidity, pressure, soil moisture, and rain. It comprises a range of sensors, LEDs, a servo motor, and two LCD screens that act as control items for the monitored parameters. The data collected from the sensors, except for the raindrop module, is displayed on one of the LCD screens. The DHT11 and BMP180 sensors offer their readings in SI units, while the other LCD screen provides a verbal reading of the soil moisture. The Automated Greenhouse System's blue LED signals the presence of rain when the raindrop module detects rain. Additionally, the servo motor is programmed to rotate 90 degrees when the humidity level exceeds the optimum level. The system's two LEDs, green and red, offer basic indications of temperature. The Automated Greenhouse System represents a significant breakthrough in the field of Biological Science by facilitating remote moderation of greenhouse factors. This innovative solution eliminates the need for cumbersome manual monitoring, offering an effective, efficient, and streamlined method for managing greenhouses.

Keywords: Automated Greenhouse, LCDs, LEDs, several parameters, remote monitoring

S-P/M-2

TISSUE CULTURE- RECENT RESEARCHES ON PLANT BREEDING

Dyooti Bhattacharyya
Class XII, Garden High School
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Tissue culture is an artificial method of propagation of new plants of the same type from a selected tissue of an existing plant with superior qualities, which can be achieved by following several stages. It is an important and effective method for the study of the biology of cells from multicellular organisms. It provides an in vitro model of the tissue in a well-defined environment which can be easily manipulated and analyzed. This provides opportunities to develop virus-free plant regeneration, disease resistance, incorporation of high protein content and other desirable traits, Tissue culture is therefore widely accepted and used. It is especially important in the agricultural, medicinal and forestry sectors. Some methods of plant tissue culture are micropropagation, somatic embryogenesis, embryo culture, anther culture and haploid culture among others. Measures such as in situ conservation and germplasm conservation have revolutionized the PTC industry.

From a single explant, thousands of plants can be produced using tissue culture. Such plants can be grown in a relatively shorter time and this method reduces the dependency of agriculture on seasonal changes. The large-scale production of crops made possible by plant tissue culture is especially important in countries with agro-based economy like India where demand for food grows everyday with rapidly increasing population. In spite of the many challenges faced by the PTC industry, plant tissue culture finds use globally in many fields including plant breeding and genetic engineering. Commercial production of plants using PTC therefore has immense potential and scope for growth as an industry producing plants of improved quality in greater quantity.

S-P/M-3

Simple Way of DNA Isolation

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Humans and nearly all other species carry their genetic information in DNA, also known as deoxyribonucleic acid. The DNA of an individual can be found in almost all of their cells. A tiny quantity of DNA can also be found in the mitochondria, but the majority of DNA is contained in the cell nucleus, where it is referred to as nuclear DNA.

DNA isolation is the process of obtaining DNA from diverse sources. Depending on the source, age, and size of the sample, different techniques are employed to isolate DNA. DNA isolation is necessary for genetic analysis, which is used for forensic, medical, or scientific purposes. Scientists use DNA for a wide range of objectives, such as introducing it into cells, animals, and plants, as well as for diagnostic purposes. The use of DNA isolation technique should lead to efficient extraction with good quantity and quality of DNA, which is pure and is devoid of contaminants, such as RNA and proteins.

With DNA isolation being a process gaining importance in the modern times, for us to get a clearer perspective of the same, our ISC curriculum includes a simple experiment demonstrating the phenomenon of DNA isolation. Among the several methods employed, the simplest one requires a banana pulp, the extraction fluid made of table salt, liquid detergent and distilled water, where we place the extract and fluid in a beaker over a water bath at 60 degree C for 15 minutes, before we stir it gently and filter 5 mL and add 5 ml of 90% ethanol. The process leads to separation of DNA molecules as white fibers, which fulfil our aim, giving us a simple process of DNA abstraction.

ABSTRACT of
UNDER GRADUATE
AND
POST GRADUATE
STUDENTS

UG/PG-P/M-1

Algal Biotechnology - A Boon to Mankind

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Mankind has recognized the extensive utilization of algae in various biotechnological fields. Macro-algae is consumed as human food while micro-algae species like *Spirulina, Chlorella, Haematococcus, Aphanizomenon, Dunaliella* are used as supplements in food industries because of their high nutritional values and bioactive compounds like carbohydrates, fats, protein, Vitamin A, B, C, E, minerals, asthaxanthin, β-Carotene, etc. Marine biomass also used as a feedstock to produce different fuels as bioelectricity, bio-ethanol, biodiesel, bio-oil, acetic acid, acetone and methanol by pyrolysis and bio-methane via fermentation. The market potential of algal bio-fuels is vast due to their sustainable technology to replace fossil fuels and is considered as third generation bio-fuels. Algae mainly contain over 50% starch which can be converted into ethanol. Their cell walls are composed of different carbohydrates used in bio-plastic production. Algal species like *Spirulina* or mixed microalgal culture along with polylactic acid by digestate treatment have been reported in bio-plastic production. Algae provide tools for the development of aquaculture to increase productivity and improve quality in fishes and shellfishes. Modern biotechnology is already making important contributions and poses significant challenges to aquaculture and fisheries development. Some species of algae are used in pharmaceutical industries as antimicrobial agents like *Haematococcus pluvialis*, as anti-cancerous agents like *Fucus vesciculus*, *Sargassum henslowianam* etc. Recent reports have shown that algae (like *Chlorella* sp.) found to inhibit SARS-CoV-2 infections as well.

UG/PG-P/M-2

Synthetic biology - An emerging technology newly introduced in greens

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Synthetic biology is a field of science that involves redesigning organisms for useful purposes by engineering them to have new abilities. Rapid expansion in the emerging field of synthetic biology has to date mainly focused only microbial sciences and human health. However, the zeitgeist is that synthetic biology will also shortly deliver major outcomes for agriculture. The primary industries of agriculture, fisheries and forestry, face significant and global challenges; addressing them will be assisted by the sector's strong history of early adoption of transformative innovation, such as the genetic technologies that underlie synthetic biology. Synthetic biology was propelled in to prominence in the late 2000s when the costs of DNA sequencing and DNA

synthesis became both cheap and fast enough to facilitate a paradigm shift in the way molecular sciences all conducted. In some ways, synthetic biology is similar to another approach called "genome editing" because both involve changing an organism's genetic code. In 2002, scientists in the United States synthesized a viral genome for the first time. Viral genomes are much smaller compared to the genomes of most bacteria and microorganisms. Today, researchers are continuing to push the limits of existing DNA-synthesis technology to help understand how genomes work. One group of researchers, called the "Genome Project-Write" (GP-Write)", is seeking to synthesize, or "write" whole genomes from human cell lines and the genomes of other plants and animals important to agriculture and public health. Advances in synthetic biology and biotechnology are providing new options for crop-pest management in agriculture.

UG/PG-P/M-3

Medicinal Value of Plant Steroids

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Plant steroids also known as phytosterols, are natural steroid compounds found in plants that have been found to have several medicinal properties. Plant steroids are unique class of chemical compounds that are found throughout the plant kingdom. The objective of this review is to discuss the medicinal value of plant steroids such as Ergosterol, Sarsasapogenin, Guggulsterone, Withanolide, Solasodine, Digitoxin, Diosgenin.These plant steroids classified in different classes based on their chemical structures, pharmacological activities and sources from which they have been isolated. Medicinal value of plants containing steroids like *Anemarrhena asphodeloides* Bunge. [Family: Asparagaceae], *Commiphora wightii* Arn. [Family: Burseraceae], *Withania somnifera* L. [Family: Solanaceae], *Solanum xanthocarpum* L. [Family: Solanaceae], *Digitalis purpurea* L. [Family: Plantaginaceae], *Trigonella foenum graecum* L. [Family: Fabaceae] by modern clinical & preclinical studies have been reviewed. Ergosterol is used to treat fungal infections, plant steroids like Sarsasapogenin, Solasodine, Withanolide are used as potential anti-inflammatory agents, Digitoxin is used as cardiac disease. There is an immense scope in investigation of the medicinal value of plant steroids. Further investigations are needed to explore the more potent lead compounds with lesser side effects and might thus hold great potential for therapeutic uses.

Keywords: Plant Steroids, Ergosterol, Sarasasapogenin, Guggulsterone, Withanolide, Solasodine, Digitoxin, Diosgenin.

UG/PG-P/M-4

Effects of plant growth regulators on *in vitro* callus induction: An overview

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In vitro callus induction plays an instrumental role in plant tissue culture and plant biotechnology, with numerous applications in agriculture, industry, and research. *In vitro* callusing involves the stimulation of dedifferentiated cells to proliferate and differentiate into undifferentiated tissue masses called callus. Callus production is particularly important for *in vitro* plant regeneration, somatic embryogenesis, genetic transformation, and production of high levels of secondary metabolites. Plant growth regulators (PGRs) play a crucial role in callus induction *in vitro*. Auxins such as indole-3-acetic acid (IAA), indole-3-butyric acid (IBA), α-naphthaleneacetic acid (NAA), 2,4-Dichlorophenoxyacetic acid (2,4-D) etc are commonly used for callus induction *in vitro*. Cytokinins such as kinetin and 6-benzylaminopurine (BAP) are also used for callus formation. However, cytokinins can produce a more organized and differentiated callus when applied in combination with auxins. Gibberellins (GA) have a positive effect on *in vitro* callus formation in some species. In contrast, abscisic acid (ABA) and ethylene inhibits callus formation. Therefore, the choice of PGRs and their concentrations play a pivotal role in callus induction *in vitro*. The optimal PGR combination and concentration depend on the species being studied and, the experimental goal. However, some plants may respond differently to different PGRs, and may require some optimization to achieve best results.

UG/PG-P/M-5

Coniferous Resins - An Overview

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Conifers contain rich resins in the resin ducts or blisters. These resins are the organic, dense, clear to translucent yellow or brown, solid or semisolid, amorphous substances of complex chemical nature. These are exuded by conifers when they are attacked by insects or pathogens. Resin repels insects or pathogens by intoxication and obstruction mechanism. They consist a mixture of small molecules of mono-, sesqui-, di-, tri-terpenoids and/or phenolic compounds, and a polymeric structure. During fossilization most volatile components are lost and a polymerization process takes place. Resins also contain oils, especially essential oils, which are not true oils. These oils contribute to the unique aromatic fragrance of many conifer resins that makes them an important component in perfumes and incenses. Resins are very rich in carbon and are insoluble in water but soluble in organic compounds.

The most common resin types are copal, dammar, myrrh, rosin, turpentine oil, balsam etc. They are used in a variety of industries, including the manufacture of adhesive, coating. Resins are used in medical industries for x-ray therapy. Turpentine oil can be used in painting, varnishing including pain relief and flavoring ingredient. Natural Resins are also used as carminative agent, an expectorant and as diuretic agent. They are also used in anticancer drug making. Thus, resins play immense role in today's pharmaceuticals.

Keywords: Resin, amber, turpentine oil, copal.

UG/PG-P/M-6

Gutsy: The Microbiome Card Game

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The influence of environment on gut microflora has changed rapidly. The capacity of our gut microbial communities to maintain a balanced and healthy state is vital for the normal functioning of human health. Lack of gut resilience results in a number of diseases like obesity, asthma, and various metabolic syndromes. There is a significant gap between our understanding of the developing gut microbiota and the trajectory of development of poor gut health. The co-evolution of gut microbiota along with the functionality of intestinal barrier in neonate, infant and during the early stages of life will be discussed. The evolutionary importance of phytoestrogens, mainly flavonoids, lignans, and steroids are reviewed along with their anti-cancer properties.

UG/PG-P/M-7

Postbiotics – A New Post in Biotics

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Introduction: Postbiotic is an umbrella term for healthful active biomolecules produced by bacterial fermentation including: protein and saccharide metabolites, short chain fatty acids, microbial cell fragments and inanimate microbial cells. Probiotics are live bacteria, spores of anaerobes and yeasts; that feed on Prebiotics to enhance their growth. Together they provide health benefits to the host. Synbiotics are synergistic mixtures of probiotics and prebiotics that benefit host by promoting thriving of live beneficial microorganism in the gastrointestinal tract. Postbiotics is a new term in the '-biotics' field, its definition awaits information for universal acceptance.

Health benefits: Postbiotics produce direct health benefits to recipients using non-viable bacterial products. Postbiotics have several beneficial effects in the context of clinical efficacy including anti-microbial, anti-inflammatory, anti-obesogenic, antihypertensive, hypocholesterolemic, anti-carcinogenic and antioxidant properties which indicate their potency in ameliorating and preventing several adverse health issues. These therapeutic roles are mediated via modulation of the resident microbiota, enhancement of epithelial barrier functions, modulation of local and systemic immune responses, alteration of systemic metabolism and systemic signalling via the nervous system.

Future perspectives: Postbiotics have emerged as a promising alternative to traditional prebiotics and probiotics. Due to their unique characteristics, such as heat stability, long shelf life, and absence of live microorganisms, postbiotics are being investigated for potential use in the food and pharmaceutical industries, as well as for their therapeutic potential in treating various diseases. While the efficacy of postbiotics is still an area of ongoing research, they may offer a safe and effective alternative to probiotics and prebiotics in cases where microorganisms and spores are not desirable or feasible.

Keywords: Postbiotic, Prebiotic, Probiotic, therapeutics

UG/PG-P/M-8

Induced Pluripotent Stem Cell – Gateways of Future Therapeutics

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Each individual stem cell in the early embryo could potentially develop into any of the various types of cells that make up the adult body. For a long time, researchers believed that once a cell had developed into a specialized cell (i.e., liver cell), it had irretrievably lost all the alternative possibilities that had been open to it in the beginning. But in now days, it has been demonstrated that somatic cells can be reprogrammed by transfection of some transcription factor into somatic cells which leads to the formation of induced pluripotent stem (iPS) cells.

Human iPS cells were similar to human embryonic stem (ES) cells in morphology, proliferation, presence of surface antigens, gene expression, epigenetic status of pluripotent cell-specific genes, and telomerase activity. In stem cell research, diseased cells can be grown by using iPS technique. All that is required is a skin and blood sample from the patient. In case of skin cells, cells from the patient's skin are first converted into iPS cells, and then those are induced to differentiate into the type of desired cell to study. These cultured cells have exactly the same genes and mutations as the cells in the patient's body. This makes the method particularly suitable for studying hereditary diseases. Researchers currently using this method to examine how cells function in a whole series of disease states: like the nerve cells that activate muscles and that atrophy in patients with amyotrophic lateral sclerosis and the brain cells that die in patients with Alzheimer's disease.

Keywords: iPS, Stem cell, Therapeutics

UG/PG-P/M-9

RNA-Peptide World: An Overview

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The RNA world hypothesis, a term first coined by Walter Gilbert in 1962 is a scientific theory that suggests that life on Earth most likely begun by abiogenesis through pre-cellular entities, most notably RNA molecules.

According to this theory, RNA was the first self-replicating molecule that eventually evolved into DNA, the genetic information storage molecule. The best evidence supporting the theory is that RNA molecules can perform many of the functions of proteins, which are essential for life. In 1981 Thomas Cech, an American biochemist, discovered an RNA molecule in a protist *Tetrahymena thermophilia* which can act as an enzyme, catalyzing chemical reactions, and may be capable of storing and expressing genetic information. It could also cut out an internal section of itself and splice the remaining sections back together i.e. self-replicate. After more organisms with this self-replicating RNA were found the RNAs were named ribozymes. This suggests that RNA may have been capable of performing the necessary functions of life in the absence of proteins as it was discovered that some ribozymes are also capable of forming peptide bonds that hold amino acids together.

RNA molecules are also much simpler, making it more likely that they could have been created from simple organic molecules found in the earliest periods of Earth 3.8-4.0 billion years ago. In fact, RNA capable of replicating has been created in a laboratory under chemical and environmental conditions similar to that of early Earth.

UG/PG-P/M-9 – A

Effects of plant growth regulators on *in vitro* callus induction: An overview

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In vitro callus induction plays an instrumental role in plant tissue culture and plant biotechnology, with numerous applications in agriculture, industry, and research. *In vitro* callusing involves the stimulation of dedifferentiated cells to proliferate and differentiate into undifferentiated tissue masses called callus. Callus production is particularly important for *in vitro* plant regeneration, somatic embryogenesis, genetic transformation, and production of high levels of secondary metabolites. Plant growth regulators (PGRs) play a crucial role in callus induction *in vitro*. Auxins such as indole-3-acetic acid (IAA), indole-3-butyric acid (IBA), α-naphthaleneacetic acid (NAA), 2,4-Dichlorophenoxyacetic acid (2,4-D) etc. are commonly used for callus induction *in vitro*. Cytokinins such as kinetin and 6-benzylaminopurine (BAP) are also used for callus formation. However, cytokinins can produce a more organized and differentiated callus when applied in combination with auxins. Gibberellins (GA) have a positive effect on *in vitro* callus formation in some species. In contrast, abscisic acid (ABA) and ethylene inhibits

callus formation. Therefore, the choice of PGRs and their concentrations play a pivotal role in callus induction *in vitro*. The optimal PGR combination and concentration depend on the species being studied and, the experimental goal. However, some plants may respond differently to different PGRs, and may require some optimization to achieve best results.

UG/PG-P/M-9 - B

Pharmacological Properties of *Trigonella foenum-graecum* L. (Fenugreek)

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Trigonella foenum-graecum L. (Fenugreek) belongs to the family Fabaceae. Seeds and leaves of fenugreek are used in different culinary practices around the world. Traditionally, seeds and leaves of *T. foenum-graecum* L. have been used since ages for treatment of various ailments in different parts of the world including China, India, Middle eastern countries, etc. for treatment of kidney problems, gastritis and gastric ulcers, abdominal cramps associated with menstrual pain, diarrhea or gastroenteritis, head colds, influenza, constipation, bronchial complaints, asthma, emphysema, pneumonia, pleurisy, tuberculosis, sore throat, laryngitis, hay fever and sinusitis. Fenugreek contains significant quantities of alkaloids namely, trigonella, trigocoumarin, nicotinic acid, trimethyl coumarin. It also comprises other important, valuable compounds like flavonoids and polyphenols. In the alcoholic extracts of the fenugreek plant, extensive variety of flavonoids, such as quercetin, luteolin, vitexin, and 7, 4-dimethoxy flavanones, is present, additionally, existence of aglycones, kaempferol, quercetin, tricin and naringenin is reported. Recent investigations have revealed plethora of pharmacological properties including anticarcinogenic, antidiabetic, antioxidant, hypo-cholesterolemic, anti-lithogenic, antimicrobial and immunological properties, make it an important compound to be used in food and pharmaceutical industries. This review summarizes the current status of the plant *Trigonella foenum-graecum* L. and its pharmacological properties.

Keywords: Fenugreek, *Trigonella foenum-graecum* L., Medicinal properties, pharmaceutical properties.

UG/PG-P/M-10

Water Hyacinth – "The Terror of Bengal"

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Water hyacinth is a perennial, free-floating and flowering aquatic plant from South America. This plant varies in size from a few inches to over 3ft tall. Climatic and water conditions are the main determinant factors for the growth and expansion of water hyacinth. It has become the world's most invasive weed due to its rapid spread, ecological adaptability, and negative impacts it causes on the environment, economic development, aquatic ecosystem and human health. Water hyacinth is an exotic species which is not native to Bengal and once it got introduced into the water bodies of Bengal, it outcompeted and eliminated other native species leading to large scale loss of aquatic life, particularly fishes. This is why water hyacinth is referred to as the 'terror of Bengal'.

Water hyacinth can completely cover the waterbodies, outcompeting native aquatic species, reducing oxygen levels, and creating ideal habitat for mosquitoes. They also prevent river transport, fishing, damage bridges, and clog dams. It significantly affects the lake hydrology by increasing the evapotranspiration of lake water. Dead water hyacinths also cause problems like river silting. It has plenty of beneficial effect also both for humans and nature, only if the amount is under control. This plant can reduce water pollution and process as animal feed, compost, and bioenergy. Considering the positive and negative impacts of water hyacinth, the population of this plant needs to be controlled to prevent ecosystem destruction and keep it balanced with human needs. Balance is the key to sustainable consumption and production.

Key words: Water Hyacinth, aquatic plant, weed, terror

UG/PG-P/M-11

BGA-biofertilizers for West Bengal: aspects & prospects

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Blue green algae constitute the photoautotrophic nitrogen fixing organisms now known as Cyanobacteria. Due to its ubiquitous occurrence in various habitats, it has been projected for its applications in different fields. Fortunately, they are of common occurrence in tropical rice fields. P. K. De (1939) first suggested its nitrogen fixing role in the rice fields of 24-Parganas which now has been clearly established & utilized in various countries. Unfortunately, BGA

biofertilizer in rice fields of West Bengal in not very popular, nor has been utilized seriously. The basic reason for it lies in the fundamentally aspects of its application. Basically, nitrogen fixing strains of BGA are region specific. Moreover, they are also sensitive to various agroclimatic conditions. So, to make this fertilizer successful following steps are to be adopted: a) Isolation & screening of region-specific strains depending on various agroclimatic conditions. b) Establishment of local laboratories in different districts and stations where agroclimatic conditions are more specific. c) The local laboratories should act as germplasm bank for the biofertilizer where regular checking and maintenance will be done. d) Regional training and awareness camps for the use of biofertilizer. e) Regular interactive meet of farmers with the experts in this field for establishment BGA in the field.

Keywords: Blue green algae, biofertilizer, West Bengal

UG/PG-P/M-12

Automatic Water Supply in Field with Help of Solar Panel

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The increasing demand for energy and the constant decline in existing sources of fossil fuels and growing alarm regarding environment pollution, have pushed mankind to discover new non-conventional, renewable energy resources such as solar, wind energy etc. Since we receive sunlight all 12 months of a year, we can utilize it in different field especially in our agriculture. As our country faces water problems almost every year due to weather vagaries, due to which agriculture is often disrupted. We can use solar energy in irrigation systems for farming. This circuit features a soil moisture sensor that detects soil moisture levels, sending a signal to an Arduino. The Arduino then rotates a servo by 90 degrees to open a valve that releases water to irrigate the field. The circuit is powered by a pair of lithium-ion batteries and charged by a solar panel. This setup is designed to automate the watering process, ensuring that the field is watered efficiently and effectively.

In this proposed system we utilize the solar energy from solar panels to automatically pump water from bore well directly into a ground level storage tank depending on the intensity of sunlight. While conventional methods include pumping of water from bore well into a well and from this well onto field using another pump, our system uses only a single stage energy consumption wherein the water is pumped into a ground level tank from which a simple valve mechanism controls the flow of water into the field. This saves substantial amount of energy and efficient use of renewable energy. A valve is controlled using intelligent algorithm in which it regulates the flow of water into the Field depending upon the moisture requirement of the land detected by the soil moisture sensor thus, conserving the water by avoiding over flooding of crops.

Proposed irrigation system mainly consists of two modules- Solar pumping module and automatic irrigation module. In solar pumping module a solar panel of required specification is mounted near the pump set.

Keywords: Smart irrigation; solar power; solar pump; moisture Sensor.

UG/PG-P/M-13

Comparative Study of Isonicotinic Acid and L-Ascorbic Acid on Induction of Innate Immunity and Secondary Metabolite Production in *Catharanthus roseus* (L.) G. Don

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Plants are constantly threatened by an array of biotic and abiotic stresses in their natural environment. Since plants are primary producers, they are at the bottom of most food chains and are prone to invasion and infection. Plants have their own immune system, but to resist towards the diseases and damage that immunity is not sufficient. *Catharanthus roseus* (L.) G. Don is an ornamental plant with pharmacological significance. Vinblastine, Vincristine, and Vindesine are anticancerous binsindole alkaloids that are medicinally and pharmacologically active. Elicitation is a powerful method for increasing and boosting secondary metabolite production and promoting plant defense. Through this study, we have tried to investigate the ability and mechanism of L-Ascorbic acid (L-AA) and Isonicotinic acid (INA) to induce and augment immune responses in *C. roseus* plant. Different defense-related enzyme assays, such as PO (peroxidase), PPO (polyphenol oxidase), and PAL (Phenylalanine ammonia lyase assay), β-1,3 glucanase, revealed increased activity as well as greater accumulation of total flavonoid and phenol content when compared to water-treated control plant. The alkaloid content of vinblastine and vincristine was determined using both qualitative and quantitative methods. Quantitative assay employing chemicals using Dragendroff reagent and by using LC-MS (Liquid Chromatography-Mass Spectrometry) was performed for reliable findings.

UG/PG-P/M-13 – A

Recent Advances in Biological Sciences

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In recent times there have been many advancements in Biological Sciences. Some of them are:

- Anatomy: Magnetic Resonance Tractograph, Diffusion Tensor Imaging, Metal Organic Frame Works
- Embryology: Surrogacy by using IVF, GIFT, IUI, ICSI
- Biotechnology: Cancer Spit Test, Speech Restorer, Muscle Stimulator, Nerve Regenerator, Portable Dialysis etc.
- Genetic Engineering: uses of Gene Drive and Stem Cells

- Nutrition: Nutritional Regulation of Gene Transcription, Fat Tissue as an Endocrine Gland, High Pressure Food Preservation (Pascalization)
- Biodiesel fuel from soya oil to decrease pollution by fossils fuel
- Biodegradable nano-particles to kill brain cancer cells in animals and lengthen their survival.
- Genetically reprogrammed plants to be drought tolerant.
- Synthetic Biology: helps in manufacture of a range of products like insulin by using bacteria, leather without cows, spider silk without spiders but the most recent addition in these sectors is Biopolymers.
- RNA Medicines: application of mRNA in covid 19 vaccine, have potential uses in some genetic diseases.
- Limb regeneration: Importance of mechanical loads to digit regeneration in mammals and that the absence of nerves don't inhibit limbs regeneration, use of acute multi drug delivery to successfully enable long term limits regeneration in frogs.

UG/PG-P/M-13 – B

Migraine Unveiled: Exploring the Intricate Role of Epigenetics for Novel Treatment Strategies

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Background

Epigenetics includes DNA methylation, micro-RNAs and histone modifications which may regulate the genetic expression in migraine and its interaction with internal and external factors, which affects the lifestyle.

Objective

To summarize the molecular mechanisms behind migraine by analysing the recent status of epigenetic mechanisms influencing migraine in a simple understandable way.

Findings

Hypomethylated DNA of Alzheimer's disease or Parkinson's disease in the promoter regions of some specific genes. Differentially expressed miRNA in all body fluids, including blood, saliva, urine and CSF, making miRNA an ideal candidate biomarker. Differential miRNA expression profiles have been identified in mental disorders and neurological diseases. Altered expression of some miRNA in patients suffering from Alzheimer's disease suggested that miRNA may have a crucial regulatory role on the mechanisms involved in its pathogenesis, these may lead to cause of tau protein aggregation.

There are few studies which are published to date, which have used different types of methodologies to determine the role of epigenetic mechanisms in migraine. Epigenetic changes affect the severity of migraine and are increasing day by day in our knowledge of the disease.

Conclusions

Causes of migraine and the occurrence of migraine among the sex ratio, especially in females could be understood by analysing the changes in DNA methylation, microRNA expression and histone modifications. These could be utilized as biomarkers that would be highly valuable for patient, molecular diagnosis and making an impactful medicine for migraine.

UG/PG-P/M-14

Phytoenvironment study of a college campus

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India is one of the 12 "mega- diversity" countries in the world and this country has a forest area of 23.81% of the country's geographical area. Mankind has been utilizing plants for food and medical purposes since time immemorial. India is considered a rich center of floral diversity. Distribution of plants depends on their genetic makeup, various environmental factors like temperature, water and other edaphic factors. Phyto environment is one of the most important features, which plays a vital role in complexity of natural ecosystems. Therefore, various aspects of plant towards health, economic value, sustainable utility, their conservation, floral assessment, and documentation are necessary. The present paper is an attempt to understand the phyto environment of New Alipore College, New Alipore, Kolkata (India). The conducted study required us to explore and outline the diversity of plants at the campus for sustainable utilization of the available plant resources. These findings will pave the way towards a more organized development of campus demography and prevent indiscriminate collection of plants and their products. Further, the study will provide a stochastic analytical view on existing plant diversity related to environmental factors in and around New Alipore College area especially on spermatophytes.

Keywords: College campus, Flora assessment, Phytoenvironment.

UG/PG-P/M-15

Analysis of phytochemicals present in *Mangifera indica* cultivars Along with in silico study against various types of cancers

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Mango, the King of Tropical fruits is not only popular for its taste but also the presence of various nutraceutical compounds like mangiferin, kaempferol, protocatechuic acid and beta carotene which have proven to have anti-diabetic, anti-carcinogenic activity. Initially, the extraction of Bioactive Compounds from the crude extract of 8 varieties of unripe mango pulp was done by solvent extraction to perform various qualitative tests. UV spectrophotometric

analysis of flavonoids was performed followed by confirmation of the compounds of flavonoids present using various UV shift reagents. In silico study was conducted for the flavonoid compound determined to be present to find its effect on enzymes involved in tumorigenesis. Chemical and Phytochemical Screening tests for Carbohydrates, Flavonoids, Phenols gave positive results. UV spectrophotometric analysis was done within 200-450nm. The flavones and flavonols exhibit 2 major absorption bands: Band I (320-385nm) and Band II (250-285nm). From the bands obtained from all of the 8 varieties of samples, in sample 5-Himsagar, the presence of Kaempferol-3-glucuronide was confirmed. From in silico study, it was confirmed that the enzyme affected by this compound is Aldose reductase (AKR1B1- Aldo-keto reductase family 1 member B1). Pan cancer analysis of the AKR1B1 gene concluded the gene expression to be comparatively much more in Head and Neck Cell Sarcoma (HNSC) along with Liver hepatocellular carcinoma, Sarcoma, Kidney renal papillary cell carcinoma, Skin cutaneous melanoma. From the in-silico study, it was concluded that various types of carcinomas where the expression of AKR1B1 and correlated genes were overexpressed could be decreased by reducing the catalytic activity of the enzymes encoded by these genes by the compound Kaempferol-3-glucuronide. Thus, mango is confirmed to also be a source of various nutraceutical compounds like flavonoids and their important role in anti-cancer activity is confirmed.

UG/PG-P/M-15 – A

Advancements in COVID-19 treatment

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In late December 2019, cases of pneumonia with unknown etiology were reported in Wuhan China later it was announced as pandemic by WHO on March 2020. It is said to be a successor of SARS CoV. SARSCoV2 has the largest known RNA genome characterized by positive sense, single stranded RNA. It has a membrane protein and envelope protein on the membrane surface and a spike glycoprotein, the main attention seeking molecule. The spike protein has S1 and S2 subunit, which is involved in bonding to host receptor and viral-host cellular fusion causing endocytosis of viral genome in the cytosol. It binds to the ACE2 receptor. SARSCoV2 has 2alpha and 2 beta family. Out of which OC43 protein family was considered to be the causative for severe acute respiratory response, causing 6.5 million deaths worldwide. Thus, many mechanisms have been developed to evade this pathogen such as RECOMBINANT protein vaccines which is divided into recombinant spike protein-based vaccines, recombinant RBD based vaccines and VLP. For recombinant spike protein, it shows deletion of polybasic cleavage site, inclusion of trimerization inclusion of two or more stabilizing mode of purification might influence the elicited immune response, but it has a disadvantage as spike proteins are hard to express but RBD is easier to express but it is a small protein when exposed alone and although potent neutralizing antibodies bind to RBD, it lacks other neutralizing epitopes that are present on full length spikes. This might impact RBD vaccines more prone to impact antigenic drift than vaccines that include the full-length spike protein.

Human nasal passages are the initial dominant sites for viral invasion, replication, and transmission. Nasal sprays can act potent alternative for COVID-19 therapeutics and vaccination.

Spray formulations can either inactivate SARS-CoV-2 or block its entry into the cells will be promising to decrease viral load in the nose. Vaccines administered through nasal route will trigger the release of immunoglobulin, mucosal IgA, serum IgG. furthermore, nasal mucosa vaccination can enhance cross-protection through generation of cross-reactive antibodies.

A nasal therapy Is well suited for self-administration by the patients, lowering the hospital visit demand and thus easing the burden of the healthcare facilities as well as eliminating the chance of cross-exposures. Up to now, it is not clear whether the low COVID-19 mortality rate in children and young adults is due to stronger immune system. Considering the latter scenario, children can act unknowingly as virus carriers and can pose a threat to the peers and older relatives. A frequent nasal spray application may effectively diminish the risk.

Another advancement in SARS-CoV-2 inhibition is to inhibit the Mpro, protease activity as it is a large polyprotein of 14proteins. Ebselen has pleotropic mode of action and acts as a strong inhibitor for Mpro as it binds to the cys145 of Mpro cleavage site and forms seleno-sulfide bond disrupting its proteolytic activity.

UG/PG-P/M-16

Green Synthesis of Zinc Oxide Nanoparticles from *Ganoderma* sp. and its Application as an Antimicrobial Agent

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The green synthesis of metal/metal oxide nanoparticles has drawn the attention of many young minds due to their advantages in terms of cost-effectiveness and environmental friendliness. This green synthesis method has successfully been able to eliminate the toxic nature of nanoparticles which is usually obtained by physical and chemical methods. Among the two distinct methods, both a top-down and a bottom-up strategy, which are used to synthesize nanoparticles, the biosynthetic approach comes under the category of a bottom-up strategy. To familiarize this green synthesis, *Ganoderma* sp. has been selected due to its versatile properties like antifungal, antimicrobial, antidiabetic, antiaging, and a lot more. To date, different nanoparticles have been synthesized from *Ganoderma* sp., like silver nanoparticles, gold nanoparticles, and zinc nanoparticles. Characterization like UV-vis, FTIR, SEM, TEM, and XRD has helped to understand the various properties of the nanoparticles, like their shape, size, and color. Nanoparticles synthesized from the extract of *Ganoderma* sp. have innumerable applications like antioxidant, antibacterial, anticancer, and a lot more. *Ganoderma* sp. extract is used to create zinc nanoparticles, and its antibacterial qualities are evaluated against a variety of disease-causing fungi. On the third, sixth, and ninth days, growth is measured and readings are made at various concentrations, including 25 ppm, 50 ppm, 75 ppm, and 100 ppm. More research is needed to determine how the green synthesized zinc nanoparticles are enhancing plant immunity and defending them against diseases brought on by diverse microorganisms.

UG/PG-P/M-17

Uncovering of Virus-Host protein interactions (a proteomic approach)

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Infectious diseases result from molecular 'cross-talks' between hosts and their pathogens. Viruses are fascinatingly diverse in composition, shape, size, tropism, and pathogenesis. They have a distinct tropism for host species and for certain cell types, although their continued co-evolution with hosts has sometimes facilitated their capacity to infect new cell types and species. Viruses induce profound changes in the cells they infect. At the core, virus replication and its spread are the formation of virus–host protein interactions. The 'cross-talks' mentioned are mediated by host-pathogen protein-protein interactions (HP-PPI) which play crucial roles in infections. Identification of host proteins targeted by viral pathogenic proteins necessary for the infection can provide insights into their underlying molecular mechanisms. Throughout the course of infection, these cellular mechanisms rely heavily on the formation of temporally and spatially regulated virus–host protein–protein interactions. There has been exponential growth in numbers and types of proteomic analyses in recent years. The integration of proteomic methods into virology has facilitated a significant breadth of biological insight into mechanisms of virus replication, antiviral host responses and viral subversion of host defenses.

The approach of this Poster project is about some of the proteomic-based approaches that have been used to characterize this dynamic virus–host interplay. Some specific points of focus would be the contributions of integrative mass spectrometry, antibody-based affinity purification of protein complexes, cross-linking and protein array techniques and so on. The benefits and limitations of applying proteomic methods to virology are explored, and the contribution of these approaches to important biological discoveries and to inspiring new tractable avenues for the design of antiviral therapeutics is highlighted.

UG/PG-P/M-18

Phytoremediation of Arsenic-contaminated soil by *Pteris sp*

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Arsenic is known to be one of the most toxic and hazardous metalloids, present naturally in soil in both organic and inorganic forms (Shrivastava *et al.*, 2015). It causes extreme health issues in human populations, when ingested for a prolonged period of time. The arsenic contamination is very prevalent in several regions of South East Asia, including India. There are several districts in West Bengal, where populations are seriously affected by the consumption of arsenic

contaminated water and crops grown in these soils. Many conventional mechanical and chemical measures are undertaken by the government to ensure removal of arsenic from the soil. But these methods are very expensive and cause an imbalance in the ecosystem. In this regard, phytoremediation processes by the usage of certain plants have been proved to be effective in removing many pollutants, including heavy metals. Arsenic toxicity in soil can be dealt with the use of arsenic hyperaccumulator – *Pteris vittata*. This plant has been found to be highly effective in assimilating and accumulating arsenic from the soil, and thus its potential can be further utilized in a more environment-friendly measure for remediation of arsenic contaminated soil.

Keywords: Phytoremediation, Arsenic, *Pteris vittata*, soil-contamination.

UG/PG-P/M-19

Bio-Fertilized Water Supply in Crop Field with Help of Solar Panel

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Use of chemical fertilizers and pesticides continuously polluting the environment not only for mankind but also for almost all the creations of GOD. Even some of chemical fertilizers used in agricultural fields are carcinogenic in long term consumption by the animals. They are continuously promoting Bio Magnification in almost all types of Ecosystems. This is very much alarming for the future generations. Along with that increasing demand for energy and the constant decline in existing sources of fossil fuels is alarming for human civilization. Environment pollution and Global warming due to uncontrolled use of conventional energy resources is pushing mankind in vulnerable situation. This is the reason for discover new non-conventional, renewable, pollution free energy resources such as solar, wind energy etc. Since we receive sunlight all 12 months of a year, we can utilize it in different field especially in our agriculture along with self-bio-fertilized water to reduce environmental pollution and Bio Magnification.

In this proposed system we utilize the solar energy from solar panels to run the pump for watering of the crop field. While conventional methods include pumping of water into field using pump run by electricity or fissile fuel. This saves substantial amount of energy and efficient use of renewable energy. In this proposed irrigation system, we are using bio fertilized water of a pond just adjacent to the crop field. The Ware of the pond is fertilized with culture of blue-green algae and some pteridophytes. On a part of the pond, poultry is made and the excretory products of the hens will also increase the fertility of the water of pond and as well as dual income system is developed by single investment process.

Keywords: Solar power; Bio magnification; Bio-fertilized water; Poultry; Crop Field

ABSTRACT of FACULTY AND RESEARCH SCHOLARS

F/RS-P/M-1

Chromatography: An important bioanalytical tool for phytoanalysis

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Chromatography is a versatile analytical method used prevalently for rapid separation of chalcogenic molecules from complex matrices. The process involves conclusive interpretation of qualitative and quantitative data acquired and analyzed for significant biological studies. Classification of chromatographic techniques is based on the characteristics of selected stationary and mobile phases. The basic procedural principles are same for different types of chromatography e.g., liquid chromatography, gas chromatography, ion-exchange chromatography, affinity chromatography. Thin-layer chromatography (TLC) is one of the simplest yet widespread molecular separation technique which provides useful qualitative or semiquantitative information in the field of plant analysis. Therefore, TLC especially TLC bioautography is being used today as an effective and economic evaluative tool for detecting the bio guided isolation of active principles of biological specimens like plants. Since the process does not require prior purification of samples, hence it is less tedious and time consuming. This paper outlines the role of chromatographic studies as rapid and reliable screening assessment technique for relating the adaptive response of plants to environmental fluctuations which further influences the susceptibility of the species under study.

Keywords: Chromatography, Plant analysis, Environmental fluctuations.

F/RS-P/M-2

Understanding Phytoplankton Diversity

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Phytoplanktons are free moving, photosynthetic microorganisms. Typically, they encounter in the surface waters of lentic & lotic systems. They mostly represent a seasonal successiveness in standing water bodies. Phytoplankton plays an essential role in aquatic ecosystem productivity by using sunlight to convert inorganic to organic carbon & afterwards provide this organic matter to the succeeding trophic level. Phytoplankton diversity study is very crucial to understand the stableness of the concerned ecosystem. Biodiversity describes the versatile life forms & their unevenness. This can be verbalized by multiple modes. Some of the common methods include diversity indices analysis, applying rank abundance models & multivariate analysis.

Key Words: Phytoplankton, diversity, appraisal

F/RS-P/M-3

Let Urbanization and Greening be Synonymous

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Tree transplantation along with Urbanization can reduce Climate Change issues on broad aspect. Application of transplantation technology i.e., replant a tree from its base habitat to save valuable trees and key stone species in urban areas like Kolkata to establish a balance between Urbanization and Greenery leading towards Sustainable Development.

Since Urbanization is inescapable but still, we have to create a balance between urbanization and greenery, so at present in Kolkata as a pilot trial various large construction company as well as Government organization is adapting this transplantation programme in their project, some examples are KOLKATA MUNICIPAL CORPORATION, PWD, RAILWAY have saved the greenery in this way.

Method-In this process, at first Botanist decide whether the tree is suitable for transplantation or not. After confirmation, branches of these trees were trimmed to minimize the load then insecticide/fungicide was applied to the cut portion and cover it with jute bags to avoid any kind of infection. After that soil was dug out in circular area cautiously without damaging the roots. Same sized pit was dug (which can completely accommodate the root portion of the tree) in the place where the plant will be transplanted. After that the plant was taken using JCB Ladder/ HYDRA/Earth mover machine and transplanted with the exposed root portion, covered with fertile soil and compost and lot of water was sprayed. After 10 to 12 days leaves are coming out if transplantation is successful then jute bags were removed but watering using spray continued.

Research limitation-It is not applicable for all plant species and needs more research. Also, for some species the survival rate is very low.

Practical Implication-These transplantation process is a unique and advanced technique to save the greenery of metro cities as well as it nurtures the biological diversity in all aspect. Mission of this abstract is to promote awareness among large private and government organisation as well as medium developers ,general people to go for transplantation rather felling/ cutting of trees and also to save storm uprooted trees to save greenery and create a balance between urbanisation and greenery leading to sustainable development which can combat the climate change issues.

Keywords- Transplantation, keystone species, Green Technology

F/RS-P/M-4

Assessment of water quality using limnological studies of East Kolkata Wetland, Kolkata Leather Complex, Kolkata, West Bengal

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The current study was undertaken to investigate the water quality by checking the limnological parameters and the impact of the leather industry upon the East Kolkata Wetland situated beside Kolkata Leather Complex (KLC), Kolkata, West Bengal. 18 physico-chemical parameters, 5 trace metals and 5 heavy metals were tested at 4 different sampling sites along the East Kolkata Wetland from the source of the canal to the area where river Vidyadhari meets the canal. The physico-chemical parameters like EC, BOD, COD, TDS, TSS, alkalinity, chloride, nitrate, nitrite, potassium, sulphate, calcium, salinity, dissolved oxygen and hardness showed deranged values in comparison to the standard water quality index. Higher nutrient content in the origin of the canal resulted in eutrophication. The presence of trace metals and heavy metals were significantly high throughout the water body. No significant deviation of heavy metal quantity leaving lead among the sites was seen. The continuous flow of the water may be the reason for the equilibrated value throughout the waterbody. Lead existed in a higher amount in only site-1. In site-4 cadmium presented significantly high in quantity. Variation of physico-chemical parameters and the presence of trace metals and heavy metals in water in large quantities indicate the poor quality of water. The study also revealed that there is no trace of aquatic fauna in sites 1 to 3 which were present a few decades ago. Some fishes are available only in site-4 where river Vidyadhari dilutes some part of the canal. This nature of water is only the result of contamination of swages and wastes from nearby tanneries. Treatment of wastes and proper monitoring should be needed to cure the water quality of the wetland.

Keywords: Physico-chemical parameters, Kolkata Leather Complex, Heavy metals

F/RS-P/M-5

Genetic Profiling: A Tailored Approach for Personalised Treatment - Hope for Better Health

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Today's changing diets, lifestyles, urbanization, and pandemic have affected people's physical and mental health, increasing disease load. Cancer, diabetes, metabolic problems, renal,

cardiovascular and neurological diseases are caused by complex networks of inherited and environmental factors. Current treatments for these disorders are difficult. Genetic variations have surfaced with the exponential progress of biological sciences and molecular methods in the last few decades. Genetic profiling provides molecular insights into these variances that can be utilized to diagnose, plan, and evaluate treatment of diseases.

Genetic profiling involves tests for targeted single gene variant, gene panel, whole chromosomes and gene expression. The techniques involved are polymerase chain reaction (PCR), restriction fragment length polymorphism (RFLP), microarray, Real Time-PCR, genome-wide association studies (GWAS), whole-genome sequencing, whole-exome sequencing, next-generation sequencing (NGS) and recombinant DNA technology (RDT).

Genetic testing finds its application in disease detection and therapeutic approach. Genetic variations may encourage beneficial lifestyle changes. Newborn screening can detect genetic problems and help parents decide whether to have children. Genetic diagnostics enable a panoramic analysis of diseases. Individual biomarker-based approaches have been used to diagnose, prognose, and treat diseases like cystic fibrosis (replacement of *CFTR* gene mutation), cancer (restoration of *p53*, *ENO1*, *KRAS*, *NCBP2*, *TFRC* gene activity), type 2 diabetes mellitus (CRISPR gene therapy), and cardiovascular disease (B-cell translocation gene-2). Thus, genetic profiling can assist examine the genetic architecture of complex traits and disorders and personalize treatment of growing polygenic health issues like neurodegenerative disorders (Alzheimer's disease, Parkinson's disease) and heterogenous diseases (polycystic ovary syndrome).

Keywords: Genetic profiling, genetic variations, genome-wide association studies, restriction fragment length polymorphism, next-generation sequencing, cancer.

F/RS-P/M-6

Replacement of fishmeal by mealworm (*Tenebrio molitor*) meals: Effect on growth performance and survival rate of goldfish (*Carassius auratus*)

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In order to search of viable alternative protein source for aquaculture, a feeding trial of six months was carried out to test the effect of mealworm (*Tenebrio molitor*) meal protein relacing fishmeal protein at 0% (control), 25%, 50%, 75% and 100% in practical diets on the growth efficiency, feed utilization and survival percentage of goldfish (*Carassius auratus*). A total of 300 juveniles of goldfish, with an average initial body weight of 00.57±0.03 gm, were randomly distributed in triplicates of five sets (D0, D25, D50, D75, D100) each with 30 fishes. At the end of the experimental period, significantly higher final weight was noted in D50 diet fed set (7.22±0.15 gm) followed by D75 set (6.52±0.10 gm) and then in D0 set (5.43±0.15 gm), whereas lowest value was recorded in D100 (4.62±0.11 gm). Fishes provided with diet D50 attained significantly higher final length (8.87±0.09 cm) and fed with D100 diet showed lowest final length (5.82±0.07 cm). The specific growth rate (SGR) in percent of control fishes (D0) was 1.27±0.01, whereas the result of SGR (%) was noted best in D50 set (1.41±0.04) and poorest (1.16±0.05) in the 100% mealworm inclusion fed set (D100). Diet D50 fed set showed best value

(3.01±0.08) for feed conversion ratio (FCR), whereas poorest value (4.86±0.17) found in D100 diet fed set. Mean value of higher survival percentage was 96.67%, observed in D50 set, in contrast lowest found in D100 set (54.44%). The result thus revealed that mealworm could be successfully used to replace fishmeal from 50% to 75% in the diet of goldfish for optimal growth and feed utilization with better survival rate. Based on the finding, mealworm is recommended as a promising feasible sustainable alternative dietary protein source to replace fishmeal in the diet of farmed ornamental fish, goldfish.

Keywords: goldfish, fishmeal, growth efficiency, mealworm, survival rate.

F/RS-P/M-7

Floristic diversity and similarity indices of two selected Trans Himalayan cold desert wetlands of Lahaul Spiti, Himachal Pradesh, India

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High Altitude Wetlands (HAWs) are such areas, which are located at or above an elevation of 2500 m with an area equal to or greater than five hectares. HAWs are characterized by low temperature, generally low buffering capacity, scanty rainfall, low humidity, low level of nutrients and high intensity of UV which results scanty biodiversity due to extreme harsh environmental conditions. The present study was carried out in Chandra Tal (32°28.552′N; 77°37.054′E; 4291 m asl altitude) and Suraj Tal (32°45.749′N; 77°23.957′E; 4789 m asl altitude) in cold desert region of Lahaul-Spiti, Himachal Pradesh. Chandra Tal is the part of Cold Desert Biosphere Reserve (CDBR), of Indian Trans Himalaya, Himachal Pradesh and also a Ramsar Site. The sampled area was classified based on lake distance, i.e., lower, middle and upper stretch. The vegetation sampling was done through quadrat method along with three elevational gradients during June-August from 2016–2019. Data extraction and analysis of ecological parameters has been done in MS-Excel and PAST using standard techniques. The result showed a total of 146 taxa were recorded from both the wetland during ecological survey period. Among 146 taxa, 108 taxa were found in Chandra Tal and 68 taxa in Suraj Tal and within its catchment area. Asteraceae was the most dominant family followed by Gentianaceae and Polygonaceae. Life form classification (Raunkiaer) of total taxa revealed that Chamaephyte was dominant form followed by Helophyte and Hemicryptophyte. Shannon diversity index showed that higher plant diversity was in middle area followed by lowest in upper area in Chandra Tal whereas in Suraj Tal highest diversity found in middle stretch and lowest in lower stretch. The evenness (e^H/S) was highest in upper stretch followed by in middle and lower stretch in Chandra Tal whereas evenness (e^H/S) was highest in lower stretch followed by in middle and upper stretch in Suraj Tal. The similarity index in the species assemblage between the three elevational gradients for both wetlands owing to the species like *Potentilla*, *Carex*, *Halerpestes*, *Rhodiola* etc. In recent years high anthropogenic pressure, overgrazing of vegetation in and

around the wetland areas, increase soil and water pollution cause very adverse impacts on these very fragile ecosystems. It is urgently vibrant that these HAWs should be conserved for maintaining the biodiversity that depends on these freshwater sources. Simultaneously long-term monitoring of the species composition surrounding the lake is needed for effective biodiversity conservation and maintenance of ecosystem services of the Chandra Tal and Suraj Tal in near future.

Keywords: Trans Himalaya, High altitude wetlands (HAWs), Cold Desert Biosphere Reserve (CDBR), Chandra Tal, Suraj Tal, Floristic diversity, Similarity index

F/RS-P/M-8

Isozyme: An Important aspect of plant development in Pineapple

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The pineapple (*Ananas comosus*) is a tropical plant with an edible fruit; it is the most economically significant plant in the family Bromeliaceae. Peroxidase (PRX, E.C.1.11.1.7), Esterase (EST, E.C.3.1.1.1), Acid Phosphatase (ACP, E.C.3.1.3.2), a-Amylase (E.C.3.2.1.1) and Malate Dehydrogenase (MDH, EC 1.1.1.37) enzymes were studied through native activity gel electrophoresis in three invitro developmental stages (non-regenerating callus, regenerating callus and leaves of regenerated plantlets) of pineapple (*Ananus comosus*) to look for up- or down regulation of specific isoforms by densitometry scanning to correlate with changing developmental stage. Certain isoforms of Peroxidase, Esterase and Acid Phosphatase, were found to be either up-or down regulated in the course of dedifferentiation, while two other enzymes, viz. a-Amylase and Malate Dehydrogenase showed little alteration in activity in the three developmental stages under study.

F/RS-P/M-9

Emerging pharmacological effects and evidences of health benefits of Coriander

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Coriander or cilantro, the most popular garnishing herb on dishes across the world has several health benefits. It is traditionally used in herbal remedies for treating diseases in different countries and regions across Europe, Mediterranean belts, Middle-east, Chinese medicine and in Indian Ayurveda and Umami practices. The plant is entirely edible and has a safe profile granted by USDA. The seeds are used as condiment and even the roots are used in different cuisines.

Extracts from leaves, seeds and oils derived from seeds as well as the volatile essential oils from seeds and aerial parts derived from steam distillation of plant have identified linalool (70-80%) as the major constituent. Linalool has numerous pharmacological and cosmetic present day human uses. A plant with good nutrient qualities it can deliver the needs of Vitamins and minerals. The extracts having vital phytochemical groups like flavonoids, sterols, phenolics, coumarins among others. The extract phytochemicals have antioxidant, antidiabetic, cardio-protective, antiatherogenic, anti-inflammatory, diuretic, hepatoprotective, antidiabetic, dermato-protective, antimicrobial and neuro-protective properties as established through in vivo animal studies. Vital enzyme inhibitions of pathological importance like HMG reductase, LCAT, glucosidase and other hormonal (insulin) and neurotransmitter (glutamate, GABA, acetylcholine, norepinephrine, serotonin and dopamine) sensitivity alterations are noted in in-vitro studies as well as in in- vivo animal studies. Essential oils are used in aromatherapy as an anxiolytic and muscles relaxant and has sedative properties (numerous neurological effects are observed in animal studies) and alleviates Parkinson and Alzheimer's disease in animal models. Cosmetic uses of its essential oil in dermatological and skin care products are increasing. It is one of the most potential herbs as a cardio-protectant and to counter metabolic syndrome and warrants clinical trials on the application of its phytochemicals in treating diseases.

Keywords: Coriander, Linalool, Cardiovascular health, Antidiabetic, Neuroprotective.

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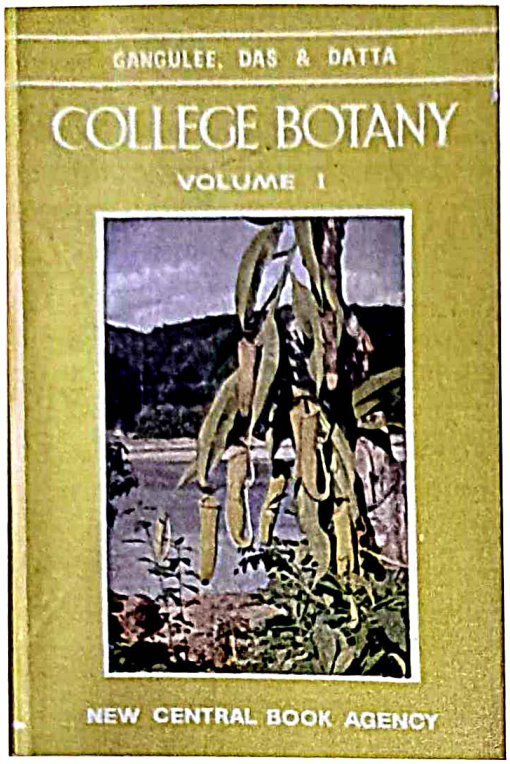
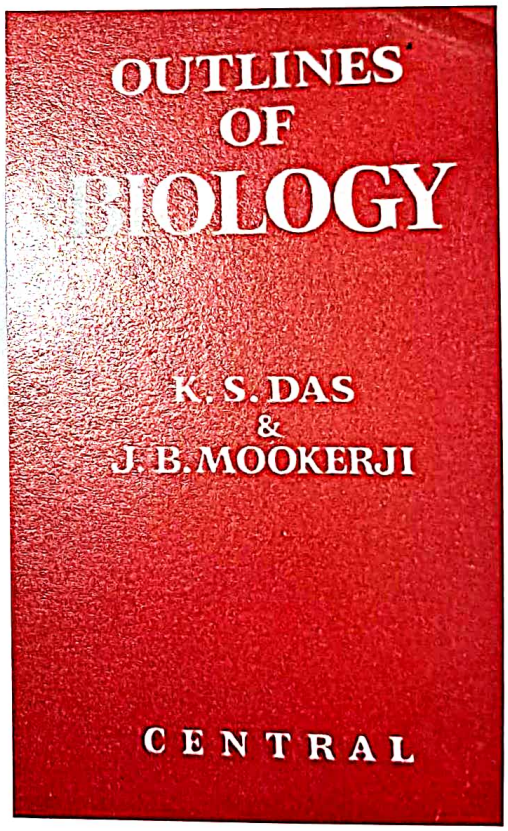


"The leaves of the world comprise countless billion elaborations of a single, simple machine designed for one job only – a job upon which hinges humankind. Leaves make sugar. Plants are the only things in the universe that can make sugar out of nonliving inorganic matter. All the sugar that you have ever eaten was first made within a leaf. Without a constant supply of glucose to your brain, you will die. Period. Under duress, your liver can make glucose out of protein or fat – but that protein or fat was originally constructed from a plant sugar within some other animal. It's inescapable: at this very moment, within the synapses of your brain, leaves are fueling thoughts of leaves."

"The plant kingdom covers the entire earth, offering our senses great pleasure and the delights of summer."

"A professor can never better distinguish himself in his work than by encouraging a clever pupil, for the true discovers are among them, as comets amongst the stars."

Carl Linnaeus



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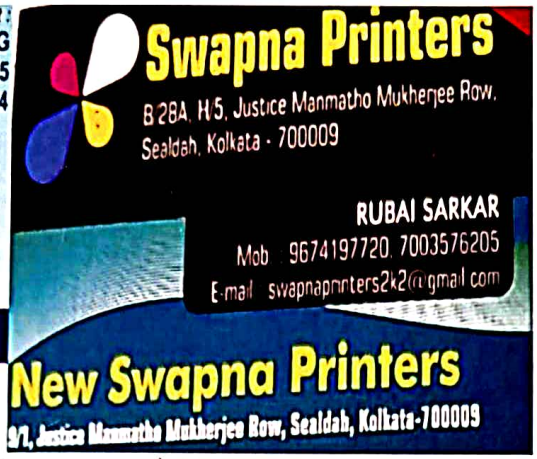

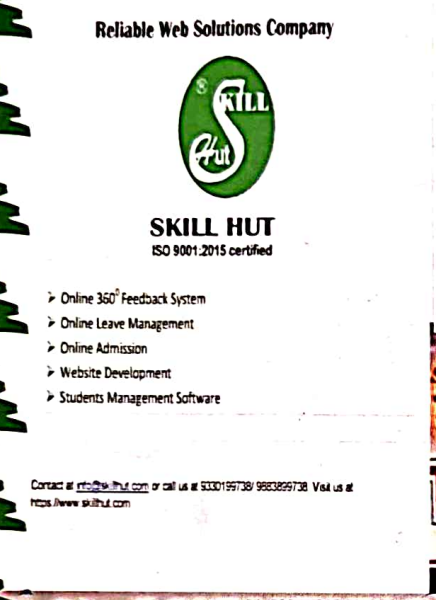

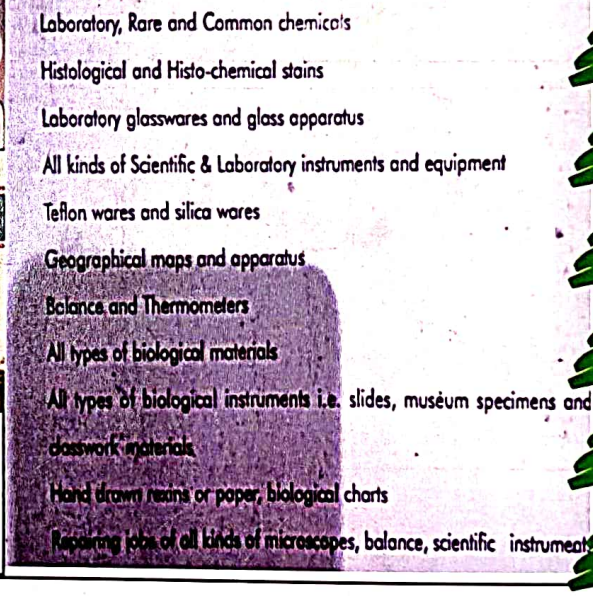
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